

Preface

Cellular and molecular diversity are, partly, the roots of differences in different populations who are the trigger points of Genetic and Epigenetic alterations. However, it seems that cancer is a Cellular/Molecular-based disease. Cancer progression is partly due to the key role of different genes, methylation of tumor suppressor and tumor related genes, and gene silencing which play crucial role at early or late stages of tumorigenic process. As the matter of fact methylation alteration may be affected by cellular miss-behavior or has influential capacity on tumorigenesis. However the main task in cancer management is to unmask the involved networks and the interactive statue of different genes to achieve the appropriate methylome based therapy.

The present book provides 17 chapters including 4 major sections as the fundamental aspects (Chaps. 1–5), brain (Chaps. 6–9), breast (Chaps. 10–12), sporadic section (Chaps. 13–16), and final mini-Chap. 17 entitles Essence of Cancer Epigenetic.

Chapter 1 is presentative of fundamental aspects of cancer epigenetic.

In this chapter different mechanisms at cellular and molecular levels are highlighted. In fact, this chapter reflects the multi-directional behaviour. The authors of chapter 1 have explored the fundamental facts, required techniques and the essential instructions either in research or in diagnosis. In addition, they have linked constitutional chromosome aberrations to the epigenetic changes. Moreover, the epigenetic based therapeutic approaches are discussed.

Chapters 2–5 reflect the application aspect of epigenetic through which the translational insight may be immersed:

In **Chapter 2**, the circulating tumor cells (CTCs) and their characteristics through migration have been explored. Different aspects of Epigenetic alterations including silencing of tumor suppressor gene, metastatic suppressors genes, functional events and micro -environmental factors are presented. The aim of authors was to bridge between CTCs and personalized therapy by especial focusing on the role of miRNA in CTCs which may lead to therapeutic innovation.

Chapter 3 deals with Retrotransposons, especially LINE-1 elements in cell biology and cancer cell biology. However, the key points comprise diversity, variation and evolution.

Chapter 4 presents the essential roles of miRNA within biological territory and mechanisms in variety of cancers. The main aim of this chapter is introducing the ways towards innovation of epigenetic drugs.

Chapter 5 provides a platform through which soul and body interact according a programming system in individuals' life. Cancer is a cellular/molecular/psychosomatic disease which relies on diversity, variation, heterogeneity and evolution. The main aim of this chapter was bridging Schizophrenia (SCZ) to different cancers in human, at cell line level and in animal models.

In **chapter 6**, the Ataxia-telangiectasia mutated (ATM) gene as a master molecular target, its functional protein and its interaction with some key cellular/molecular targets are explored.

ATM as a magic- gene is present within divers territories in our body. However, ATM is, effectively, involved in both malignant and non-malignant diseases.

In **chapter 7**, the basic insights of MCPH1 gene, its protein and its role in cancer and selected non-cancerous diseases have been explored. Different molecular and functional aspects of MCPH1 in various neoplastic disorders including brain tumors have provided the peculiarities of this gene in diseases.

Chapter 8 presents *P53* gene as a remarkable Antitumorogenesis in different cancers. However, a cross talk between *p53* promoter methylation and its protein expression in brain tumors is required to be well defined. In this chapter the fundamental aspects of *p53* gene and the status of methylation are explored.

In **Chapters 9**, the predictive role of *O*⁶-methylguanine DNA methyltransferase (MGMT), as a therapeutic tool in brain tumors, especially in malignant gliomas; and the methodological requirements are explored. The clinical managements are also discussed.

Chapter 10 deals with the Epigenetic alterations, diagnosis, tumor classification/ prognosis and treatment. Three remarkable receptors including estrogen receptor (ER), PR, and HER2/neu with diverse functions and impacts on breast cancer progression were discussed.

In **chapter 11**, Retinoic acid receptor gene beta 2 (*RAR*β2) as a hero in cancer, and manner of its cooperation have been explored.

Interactions of epigenetics with environmental factors, including nutrition, the role of chemopreventive agents in epigenetic, cancer stem cells, the main target receptors and genes, protein expression, miRNA and the therapeutic insight of *RAR*β are presented. Furthermore, detection of the methylated *RAR*β2 in primary breast cancer is a key task to evaluate tumors with a positive responsiveness capacity to RA therapy.

Chapter 12 reflects the practicability of translational approach in Retinoic acid receptor-β at a glance. By considering the methylation status, the importance of genetic factors at a triangle level including DNA, RNA and protein; and the bridging system between functional and clinical insights are challenged. Hopefully *RAR*-β will be considered as an influential target in cancer prevention and therapy.

Chapter 13 deals with Methylation in the Colorectal Cancer. The interaction between hazard environmental factors and colorectal cancer (CRC) is highlighted. In this chapter the authors have focused on histological progression and evolution-

ary pattern as well. The molecular characteristics and the mode of hypermethylation of involved genes are presented. The authors have emphasized on the key role of epigenetic on our life. The final aim in this chapter is the translational paradigm.

Chapter 14 is aimed on the epigenetic mechanism of tumorigenesis in Malignant Rhabdoid Tumor (MRT). In this chapter, the cellular senescence, apoptosis, mitotic control genes, pre-replication complex, chromatin behavior, cell proliferation and differentiation are discussed.

Chapter 15 presents Epigenetics of Thyroid Cancer in which the thyroid related genes have been explored. Besides the characteristics of the candidate genes in thyroid cancers have been discussed.

Chapter 16 presents an introduction to Bio-Energy and Bio-Resonance technology by linking this paradigm to Genetic and Epigenetic. This chapter is reflective of new insight on Bio-mechanical resonance within the cells, tissues and molecules. This chapter focuses on epigenetic modifications and transposons as well. In addition, an interesting link between environmental hazards, diverse electric oscillation in chromosome and epigenetic statue of organism has been also highlighted.

Chapter 17 presents an evolutionary insight in cancer epigenetic and was aimed to apply a bridging system between the provided chapters and also pave the way towards the more complementary manner for the future planning.

The interactive regulatory system characterizes and differentiates epigenetic as an extraordinary molecular biological territory. I do believe that, epigenetic is beyond DNA methylation, RNA interference and histone modification in cancer development, therefore, I aimed to provide three modeling schemes including (1) 'The map of cancer development'; (2) Epigenetic Programming; and (3) Diverse-methylation process, target and function at different ages.

The bridging system between Science and Medicine was the main design of this book which has been, mainly, edited on the basis of research paradigms. In this regard, I do hope that this book, would be useful as an educational and translational research package for Scientific and medical medias. I also appreciate receiving your comments.

Sincerely
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